Sarracenia Alata and S. Leucophylla Variations

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Continuing our centerfold series on variations in sarracenias, we now enter the most difficult area. The Gulf coast of the United States extending roughly from east Texas eastward to the central panhandle of Florida contains many large stands of pitcher plants. As is the case with most sarracenia habitat, the number of good, large locations is rapidly decreasing due to the usual factors of habitat destruction for farms, sylviculture, housing, industrial and shopping developments. This change has proceeded at an extremely rapid pace in the last ten years or so.

One of the things that most botanists and naturalists quite familiar with sarracenias have noticed for years in this area is the phenomenon of hybrid swarming in large savannas. We all know that pitcher plants hybridize quite easily, and contrary to some minority opinions, most often exhibit hybrid vigor. Plants resulting from crosses into *S. purpurea* are sometimes described as producing more vertical pitchers that topple over easily when filled with water and therefore they would not survive well. I have seen hundreds of these hybrids and they are supported quite well by tall grasses, each other and shrubbery, and contain trapped prey.

At this point we should briefly review some basic genetic terminology. For more details, please refer to a genetics textbook. A simple hybrid between two species, subspecies or forms is called an F_1. In the case of pitcher plants, the hybrid offspring have an intermediate appearance between the two parents. When a fertile F_1 hybrid is self pollinated, any resulting progeny are termed F_2. In the case of sarracenias, most of these plants maintain a hybrid appearance indicating that the phenotype of the plant is due to the effects of many genes. In an F_2 situation, one may find a few extreme plants that seem to have more characteristics of one of the original parents rather than have a true intermediate appearance. When any kind of a fertile hybrid is crossed back into one of the parent species, this produces a situation best described as backcrossing with possible introgression for discussion purposes here. A stand of these plants present almost a rainbow of color and form variation.

Introgression may occur in genetically selected fashion. An "introgressed" series of plants which have, for example, *S. alata* (yellow flower) and *S. leucophylla* (red flower) as original parents may not necessarily have the intermediate orange or pink flower—It may tend more toward pure yellow or pure red. If any kind of hybridization, including introgression, becomes genetically fixed so that the plant characteristics breed true by sexual reproduction, then we have a case to argue a new genetic taxon at some level. How this genetic fixation occurs should be read about in that genetics text. One pathway is macrorecombination whereby a portion of a chromosome carrying character(s) becomes fixed in each of a pair of chromosomes.

So, what does all this mean? It means you have to keep your eyes and mind open when botanizing this geographic area for pitcher plants. Most earlier botanists and I have found "hybrid swarming" to be much more common and the plants doing well than is suggested by two ecologists who in a semi-popular article and in a yet unpublished long work indicate that in their opinion the hybridization effect is not nearly as common and that the hybrids are ecologically inferior. Further, they state that hybrids occur most commonly in areas disturbed by man. In the first case, I think they have perceived much hybridization and introgression as variation within the basic species of the area due to species and field inexperience. Secondly, of course any seed needs space, light, soil and moisture to germinate and grow to an adult plant. While human disturbance may play a part in modern times, one also has to consider the nature of bunchgrasses and sedges in these savannas. They tend to grow so that there are significant areas of bare ground around the plants. This is hidden when the grasses and sedges grow for years and fall over. But as soon as fire occurs, the bare areas are obvious, sufficient for seedlings of all kinds of species to take hold.

Now that this is all said, is the situation hopeless for identifying probably true genetic variants that will breed true when selfed? I think we can discuss a few with reasonable certainty, keeping

FIGURE 1— A typical plant of *S. leucophylla* with little red venation.

FIGURE 2 AND 3— *S. leucophylla* with more red venation.

(VARIATIONS IN *SARRACENIA AL*

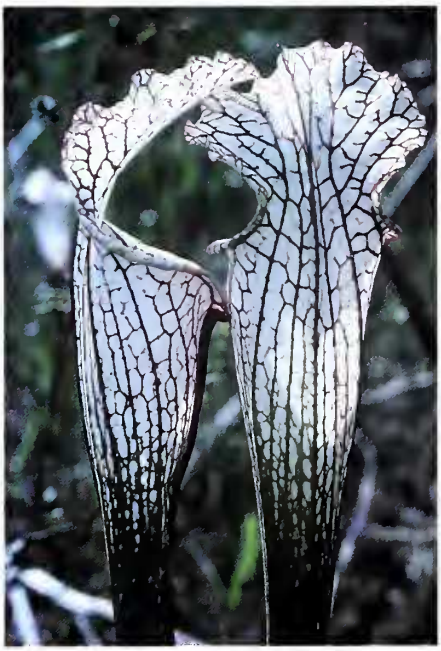

FIGURE 2 AND 3— *S. leucophylla* with more red venation.

FIGURE 4— Pitchers of *S. leucophylla* with no red; flowers were yellow.

FIGURE 5— Probably introgressive of some other species into *S. leucophylla*, most likely *S. rubra*.

FIGURE 6— Typical clump of *S. alata* with mixed mostly green to lightly veined pitchers.

A AND *S. LEUCOPHYLLA* by Schnell)

FIGURE 7— *S. alata* with deeper red tops and "red throats."

FIGURE 8— "Stocky, pubescent form" of *S. alata*.

in mind that these variants themselves may have originated by hybrid fixation! You have to kind of develop an eye in the field to see what is going one, and to admit that in areas you do not know what is going on. Then, after developing hypotheses, you have to be willing and have facilities to make selfings and crosses and raise thousands of seedlings to at least the stage where you can tell what they are before you dispose of them to make more room.

I will start out with *S. leucophylla*. Figure 1 shows an average "typical" pitcher of the species, mostly "white-topped" (I will try to avoid as much technical jargon as possible) with minimum red venation, the spaces between veins being rather large—Larger than what?, you say. We will see later. The flower in this plant was deep red and had the typical morphology for the species.

In Figures 2 and 3, we still see what I interpret as simple *S. leucophylla,* but with more red venation. Note the expanded top, high and wide hood with broadly ruffled margin. The spaces between veins are still rather large.

In Figure 4, we have the pitcher of what is probably a true genetic variant somewhat parallel to the *heterophylla* situation in *S. purpurea* ssp.*purpurea*. The pitcher top is so pale and the lack of red venation gives the plant an almost ghost-like appearance and it stands out readily in a stand of typical plants, even when not in yellow flower. This plant bore a yellow flower the following spring in cultivation, out of sync with the best pitchers for photography. It is interesting to contemplate how this probable genetic variant maintains its integrity and is not simply swamped by the red-pigmented plants during pollination and fertilization.

In Figure 5 we have an interesting situation. In fact, plants of this sort are often displayed as extreme red venation in the species. One of the large recent books featuring color photos has a plant very similar (and even more like what I think this is) pictured as the species. But note that the pitcher lid is more closely oppressed to the mouth, the pitcher is more narrow at the top, and the veins are more closely knit (That is "more or less space than what?"). This is most likely an introgressed hybrid, probably with *S. rubra* being the other plant involved. I judge *S. rubra* because this plant was not in the *S. alata* range, and by the venation and hood opposition which is very reminiscent of *rubra*.

It is not easy, and it takes a while, but you can have fun making these observations and deductions eventually. Let us consider *S. alata* next.

While most range maps of *S. alata* (including the one in my book!) show the species to be rather continuous across Louisiana into east Texas, there is actually a small break or disjunction of about 50-75 miles between east Louisiana and the Big Thicket of eastern Texas. In the latter area, Phil Sheridan and some local botanists have made some interesting variant observations on this species. We hope that Phil will publish this material soon, perhaps in CPN or in a summary here. Our discussion will be concerned with the eastern part of the range.

In Figure 6 we see a typical clump of several clones of *S. alata* with pitcher coloration varying from nearly all green to moderate red venation. But anyone traveling through southern Mississippi must have noticed the variants shown in Figure 7, those plants of the species with red tops and/or red "throats." The red coloration of the interior of the upper pitcher opening and hood lining can be so deep it almost appears black. This coloring is, of course, most apparent in full sunlight and good growing conditions. While the variants are a minority they are still common enough to be easily seen. As one might expect, to complicate the situation, hybrids between Figures 6 and 7 do occur. I feel that this character is genetically fixed.

Finally, we have the problem of the "hairy, stocky" *S. alata* which has been discussed and referred to in these pages before. These plants (Figure 8) are most commonly found north of Mobile along US 45, but they are not easy to find the first time. The flower is not remarkable, being typical *alata* in morphology and color. The pitcher is characterized by an average shorter height rapidly broadening into the mouth, giving it a rather "stocky" appearance. Most interesting is the presence of pronounced pubescence ("hairiness") which can be seen and felt—Typical *S. alata* has a nearly smooth pitcher exterior. My initial impression after observing, growing and selfing these plants is somewhat mixed. I lean toward an unfixed introgression, probably due to *S.*

purpurea genetic influences somewhere in the history of the plant. This would explain the stockiness and indumentum. There is one problem, and I am working on it still. The plants appear in rather large (relatively) uniform stands where they occur, and the *purpurea* influences may therefore be genetically fixed which would indicate at least a form taxon. Some stands have *S. purpurea* growing nearby while others do not, but the last does not bother me since any number of things could have happened to *purpurea* where it might have been and in hybrid seed dispersal.

I will leave you with that incompletely solved problem, and many more you will see for yourself as you gain experience in exploring our Gulf coast pitcher plant stands—while they last!

Herbarium Samples and Preserving CP Specimens

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Have you ever tried to describe a plant to another person, or imagine one that they were describing? It is not as easy as it sounds! Human nature being the way it is often causes unintentional exaggeration or misinterpretation. We can all imagine how the stories of giant man eating plants came about! Botanists solved such plant description problems centuries ago by preserving specimens and then storing them in herbariums or "plant libraries" for reference and study (Altschul 1977, James 1950).

The plant press is the "workhorse" of the herbarium and consists of two wooden lattices measuring 30x46 centimetres which have repetitive layers of paper, blotters and corrugated cardboard "ventilators" between them. The layers are arranged so that each plant sample is within a folded paper and ends up with a blotter on either side of it. The ventilators are spaced every two plant layers to speed the drying process. The whole press in turn is held together by a pair of adjustable binding straps. Due to the number of plants collected in the field, a plant press may often end up nearly half a metre thick by the end of the day. Once dry, the plants are mounted with glue or tape to standard 29x42 cm (heavy manila paper) herbarium sheets along with their collection data and are then filed taxonomically and/or geographically (MacFarlane 1985).

Both easy and inexpensive, herbarium samples are an efficient means of documenting and identifying new plants found in the field or for recording species that you grow at home. The advantage of herbarium specimens are that they last indefinitely, the whole plant can be

PLEASE SEE SAMPLES ON PAGE 85

Finished laminated herbarium samples and supplies used. Photo by R. Lamb.